

**The Future of Human Longevity:
How Important Are Markets and Innovation
Hearing of the Senate Special Committee on Aging—June 3, 2003
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During the last century human longevity exploded as much of the world became industrialized. Productivity and income rose to unprecedented levels, permitting vast improvements in the standard of living. Innovation in agriculture permitted adequate nutrition for whole populations. Innovation in engineering resulted in sanitary and safe living and working conditions. And innovations in affluence and medicine resulted in immunizations and antibiotics that could be provided through primary medical care for all.

Past and Future Improvement in Mortality

In recent decades, Europe, North America, and Japan have experienced great increases in life expectancy at age 65, averaging nearly a 1-year increase per decade. Some have risen faster, most notably Japan, and some slower. The United States has been about average for this group, as seen in the first chart.

The Social Security Trustees report to the Congress on the actuarial status of the Trust Funds. The long-range projections needed for this assessment depend critically on assumptions for the future course of longevity. How good have those projections been? The second chart shows that the period life expectancy projected in the 1983 and 1992 Annual Trustees Reports for the year 2000 were pretty accurate. If anything, the projections in 1983 were a little optimistic, slightly overestimating life expectancy for 2000, particularly for women.

For the future, mortality at higher ages, at age 65 and above, is what we pay most attention to. Mortality at younger ages has declined so much that now three fourths of all deaths occur at ages 65 and above. Chart 3 shows that in 1900 less than one fifth of all deaths were at 65 and over. Infant mortality and death at ages under 65 declined dramatically over the last century.

The average annual rate of decline in mortality for men at 65 and older was fairly consistent over the last century. Chart 4 shows an average annual decline of almost 0.6 percent for the last 100 years, and about 0.7 percent over both the last 50-year and 18-year periods. For the future, we project continued declines in male aged death rates at over 0.7 percent per year. This is no small assumption. Matching the accomplishments of the last century, with the pure positive effects of improved sanitation, nutrition, and medical accessibility for all will not be easy. AIDS, SARS, and antibiotic resistant microbes, along with increasing obesity and declining levels of exercise, remind us that mortality improvement will not be automatic. Gains from

replacement organs and genetic engineering will be expensive, and may be difficult to provide for the population as a whole.

For women, the last 18 years have been challenging, with no improvement in mortality for the age group 65 and over, as seen in chart 5. The trend toward an ever widening gap in life expectancy between men and women ended in 1982. Going forward, we now feel even more confident than in the past in projecting mortality improvement at about the same pace for men and women.

Mortality for the total population, men and women combined, is shown in chart 6. The average annual decline between 1900 and 2000 for the age group 65 and over, of a little over 0.7 percent, is about twice as large as experienced during the most recent 18 years of this period. Going forward, we believe that achieving mortality improvement for the aged at nearly the same rate as for the last century is a reasonable assumption, with a roughly equal likelihood of doing better or worse.

For ages under 65, there is some agreement that mortality declines will diminish from the level of the last century. The 1999 Technical Panel appointed by the Social Security Advisory Board endorsed the Trustees' pattern of improvement by age group. Moreover, the rate of improvement diminished through the last century, with slower average rates for the last 50-year and 18-year periods.

Implications for the Cost of Social Insurance

The benefit structure of Social Security is indexed to reflect average wage growth and price inflation, and is thus relatively insensitive to variation in these parameters. However, the program and its financing are not automatically adjusted to offset the effects of changes in demographic parameters like birth rates and mortality.

The apparently permanent drop in the total fertility rate for the United States that started in the 1960's is slowing the growth in the population. More importantly, it is changing the age structure of the population, increasing the "aged-dependency ratio", i.e., the ratio of population age 65 and over to that at ages 20 to 64. The rise in chart 7 between 2010 and 2030 shows this effect. Continued increases in the ratio after 2030 reflect the more subtle and increasing effects of increasing longevity.

Social Security is financed on a basically pay-as-you-go basis, largely from payroll taxes. Thus, the ratio of beneficiaries to current workers is a critical determinant of the cost of the program, per worker. Chart 8 shows a pattern almost identical to the aged dependency ratio.

Because Social Security average benefit levels essentially track the average earnings level of workers who pay the payroll-tax contributions, the pattern of cost rates (as a percentage of taxable payroll) are the same as the aged-dependency and worker-to-beneficiary ratios. Chart 9 displays this pattern.

Continued increases in human longevity will require change for the Social Security program. We have known that truth for decades, and it was even evident in the projections presented in the 1983 Trustees Report produced right after enactment of the last major Social Security reform legislation. How quickly longevity will increase is a subject we will continue to debate. The Trustees track record of the last 20 years has been good. If the further improvements now projected are realized or exceeded, we will need to choose as a nation from a range of options for putting Social Security back on firm financial footing

Thank you very much and I look forward to your comments and questions.